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U. S. DEPARTMENT OF AGRICULTURE
FARMERS' BULLETIN No. 1662

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Husker-Shredders in Corn-Borer Control

1931

IN SECTIONS infested with the European corn borer it has been found that, with proper adjustment and careful operation, husker-shredders kill from 95 to 98 per cent of the borers in the stalks. Most of the borers are killed while passing through the snapping rolls.

The operator should train his ear to the sound made when the husker is running normally. Loose connections may thus be quickly detected.

Serious damage may be caused by a loose knife or shredder bar striking on the shear bar. The head bolts should be gone over periodically, especially after the knives or shredder bars in the head have been changed.

Proper lubrication is very important. The bearings of the head, snapping rolls, husking rolls, and the blower require frequent attention.

Shredder heads, combination heads, and knife heads cutting 2 inches or less are about equally effective in destroying corn borers.

The greatest number of borers is killed when fodder is cut into half-inch lengths and the least number when the fodder is cut into 4-inch lengths. Live borers in the stored fodder in excess of 2 per cent may become a source of increased infestation.

This bulletin is based on tests run on husker-shredders during 1928–29 in the vicinity of Toledo, Ohio, by the Division of Agricultural Engineering of the Bureau of Public Roads. It describes the operation of the husker-shredder and makes suggestions as to its operation and care with special reference to corn-borer control.

Washington, D. C. Issued March, 1931

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HUSKER-SHREDDERS IN CORN-BORER CONTROL

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INTRODUCTION

THE HUSKER-SHREDDER has been in use in sections of the Corn Belt for the past 35 years. Its use, however, was more widespread before the introduction of the silo and the tractor, and before legumes became so universally grown. These changes resulted, on many farms, in a substitution of the new feed crops for the shredded stover, and in a decrease in the roughage requirement due to the replacement of horses by tractors. Shredding is still important, however, in those districts and on those farms where there is a shortage of hay or straw for roughage; where the number of cattle is too small to justify a silo; where large herds of dairy cows are kept, requiring large quantities of roughage for feed and for bedding; and where shredding is done principally to get the corn husked. In western Ohio and in southeastern Michigan 25 per cent of the 1927 corn acreage was shredded, while smaller acreages were shredded in Indiana and the States to the westward.

Farmers who shred regularly express a preference for shredded stover over the whole stalks for feeding and bedding. The stover is under cover and conveniently stored for feeding, is easily handled, and makes excellent bedding and manure. Stables and barnyards can be cleaned much more easily than when whole stalks are fed, for it is a difficult task to pull out whole stalks that have been tramped all winter. In territory infested by the European corn borer the long stalks must be destroyed, but when shredded stover is fed, the débris from the barnyard can be spread directly on the field, because it has

been determined by detailed tests that the husker-shredder kills a high percentage of the borers contained in the infested stalks. For this reason the husker-shredder has become an important agency in borer destruction.

Success in the use of the husker-shredder, both as a husking machine and for corn-borer control, depends largely upon the care it receives and its handling during operation. Proper handling and care insure greater efficiency of operation, longer life of the machine, fewer delays, and smaller repair bills.

HOW THE HUSKER-SHREDDER OPERATES

When cornstalks are fed into a husker-shredder they are seized by and drawn between the snapping rolls which are held together by spring pressure. As the stalks pass between the rolls the ears are snapped off the stalks and dropped on the husking bed below. The husking rolls then remove the husks and drop the ears into a conveyor which delivers them to the wagon or crib.

The stalks pass from the snapping rolls over a shear bar where the shredding or cutting is done by the revolving head. The shredded stover falls on a shaker where any shelled corn and dirt are removed, after which it is dropped into the blower fan and is blown into the mow or stack. The shelled corn passes over a cleaning screen and then falls through a blast of air into the shelled corn elevator which delivers this corn to the bag or box ready for feeding.

There are, of course, variations in the accomplishment of these operations by the different makes of huskers. This bulletin deals with the principal mechanical features involved in most of the standard husker-shredders now on the market.

HUSKER-SHREDDER UNITS

FEEDER

Three types of feeders are used on husker-shredders, namely, the hand, gravity, and slatted-conveyor feeds. The hand feed was the first type used and is found on many of the 4-roll huskers at the present time. In using this feeder, the operator after cutting the bands of the bundles pushes the stalks forward until they are gripped by the snapping rolls. To do this the operator must work close to the rolls, and for his protection a safety clutch lever, operated by the left leg, is usually provided. This lever should be tried often to be sure of its effectiveness.

The gravity feeder is used on machines having combination snapping and husking rolls. (Fig. 1.) The operator spreads the bundle and lets the stalks slide down into the snapping rolls. With this type of feed there is little danger of injury from the snapping rolls, consequently no safety device is provided.

The conveyor type of feeder is used on all huskers larger than 4-roll that use horizontal snapping rolls. The operator stands facing the snapping rolls with the feed table between himself and the rolls. (Figs. 2, 3 and 4). He spreads the bundle on the conveyor which carries it forward to the rolls. Machines using this type of feeder are equipped with a safety device so that the feeder and

snapping rolls may be stopped whenever the operator is in danger or when the husker tends to clog.

SAFETY DEVICES

All safety devices on huskers equipped with the conveyor-type feeder are designed to enable the operator to stop the feeder and the

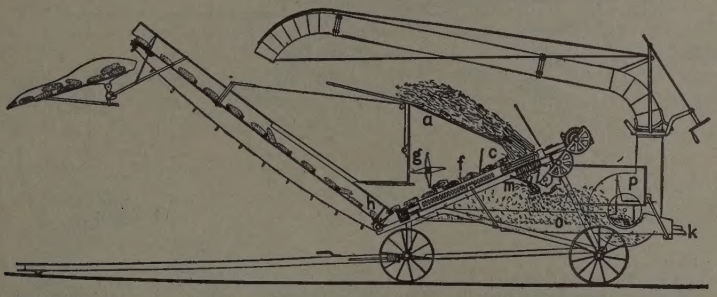

FIGURE 1.—Husker-shredder equipped with gravity-type feeder (*a*); *c*, *f*, combination snapping and husking rolls; *g*, ear-corn kicker and carrier (*h*); *l*, cutter head; *m*, shear bar; *o*, combination shaker and cleaning shoe using no-choke sieve; *k*, shelled-corn pan; *p*, blower

snapping rolls at will. Certain other types of safety devices cause all the moving parts of the machine to stop except the head and the blower fan. Two methods of operating the safety clutches are used. Either a lever is provided within easy reach of the operator (fig. 3),

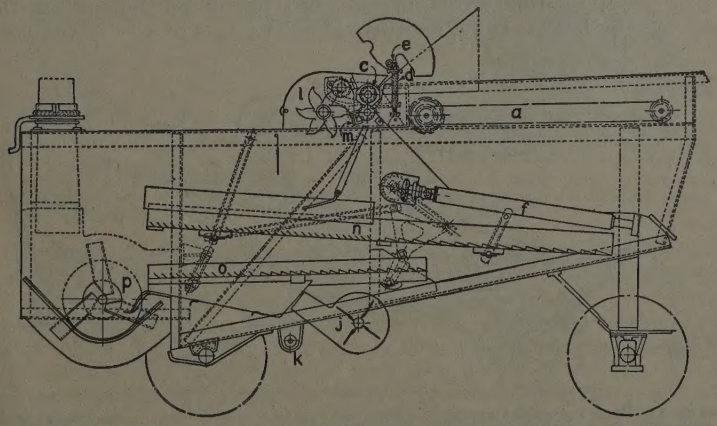

FIGURE 2.—Husker-shredder equipped with conveyor-type feeder (*a*); *c*, horizontal snapping rolls; *d*, snapping-roll springs and adjusting nuts (*e*); *f*, husking rolls; *n*, shaker-type conveyor; *o*, cleaning shoe and fan (*j*); *k*, cross auger; *l*, shredder head; *m*, shear bar; *p*, blower

or his weight is required on the feeding platform to keep the clutch engaged. The safety lever often is placed across the front of the feed table so that when the operator leans too far forward the conveyor will be thrown out of gear. Either of these methods is

effective. With the conveyor type of feeder there is little danger of injury to the operator, and the safety clutch is used primarily for stopping and starting, or for stopping when the husker clogs. If the snapping rolls clog the stalks should be dislodged with a softwood

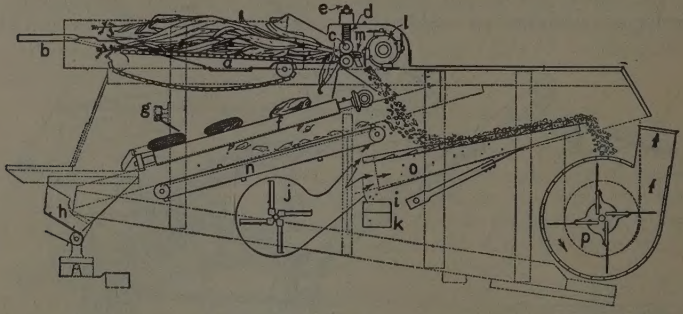

FIGURE 3.—Husker-shredder equipped with conveyor-type feeder (*a*); *b*, safety lever; *c*, horizontal snapping rolls; *d*, snapping-roll springs and adjusting nuts (*e*); *f*, husking rolls; *g*, ear-corn kicker and carrier (*h*); *o*, cleaning shoe and fan (*j*); *i*, *k*, cross shake and screen; *l*, cutter head; *m*, shear bar; *n*, slatted conveyor; *p*, blower

stick. One should never reach in with the hands as the clutch may accidentally engage. A hand or an arm is a high price to pay for carelessness.

SNAPPING ROLLS

The snapping rolls which operate in pairs pinch the ears off the stalks as the latter are pulled through. The axis of one of the rolls

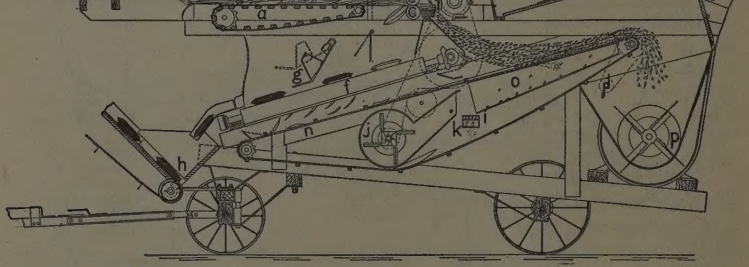

FIGURE 4.—Husker-shredder equipped with conveyor-type feeder (*a*); *c*, horizontal snapping rolls; *d*, snapping-roll springs and adjusting nuts (*e*); *f*, husking rolls; *g*, ear-corn kicker and carrier (*h*); *o*, cleaning shoe and fan (*j*); *i*, *k*, cross shake and screen; *l*, cutter head; *m*, shear bar; *n*, slatted conveyor; *p*, blower

is fixed while that of the other floats under the pressure exerted by the snapping-roll springs. Pressure on the snapping rolls can be varied by the adjusting nuts shown at point *e* in Figures 2 to 5 inclusive. For ease in feeding a low pressure is used on the rolls, especially when the butts of the stalks are wet or frozen. Such an adjust-

ment is objectionable because an excessive amount of corn is shelled from the ears, and the husker has a tendency to clog.

The number of snapping rolls varies. Some machines have two rolls only (fig. 4), while other machines have two pairs of rolls mounted parallel with the head, one pair above the other. Most huskers having the parallel mounting use only one pair of rolls. These are of the same length as the shredding cylinder. Another common type of mounting consists of two pairs of rolls mounted with their axes at right angles to that of the shredding cylinder and set at an angle of approximately 45° with the horizontal. (Fig. 5.) The third type is the combination rolls, the upper ends of which are used for snapping and the lower ends for husking. (Fig. 1.) This type has gravity feed.

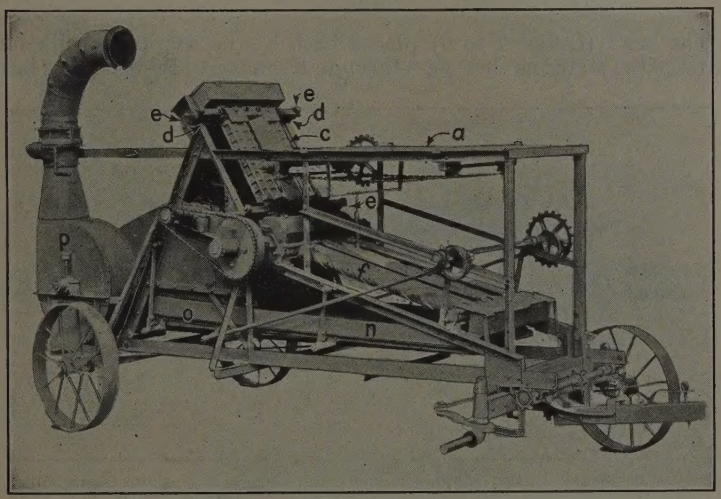

FIGURE 5.—Husker-shredder equipped with conveyor-type feeder (*a*); *c*, vertical snapping rolls; *d*, snapping roll-springs and adjusting nuts (*e*); *f*, husking rolls; *n*, combination shaker-conveyor; *o*, cleaning shoe; *p*, blower

The surface of snapping rolls varies considerably with different makes of huskers. Some have two corrugated rolls working together, some have a corrugated roll and a pitted roll, while others have two pitted rolls. These rolls are timed according to the work being done. The corrugated rolls, for example, may be so timed that the two bars meet, followed by two grooves, or the bar of one roll may meet the groove in the other. The first is the better adjustment for large or frozen stalks, but it has a tendency to shell more corn. For ordinary operation the second adjustment is preferable.

HUSKING ROLLS

A husker-shredder is rated in size according to the number of its husking rolls, which range from 2 to 12. The 4, 6, and 8 roll machines are most common. The husking capacity and power required depend upon the number and size of the husking rolls.

The husking rolls (figs. 2 to 5) are located below and in front of the snapping rolls and operate in pairs. Pegs are inserted in the rolls, which must be so timed that the pegs on one roll of a pair fit into pits on the other as the rolls revolve. The number and size of the pegs used are determined by the condition of the corn. If the husks are tight and are hard to remove, pegs longer than the regular husking pegs may be used. It is possible to insert extra pegs in the husking rolls of many huskers.

Springs hold the husking rolls together. These springs should be so set that the rolls will be held together just tightly enough to grasp the husks and pull them off the ears as they are loosened by the husking pegs. If the rolls are set too tightly, undue wear on the husking-roll bearings will result.

HEAD

The head (*l*, figs. 1 to 5) placed back of the snapping rolls cuts or tears the stalks as they pass through the latter. In machines having a shear bar the head shaft is parallel with the shear bar; in other machines the shaft is parallel with the snapping rolls.

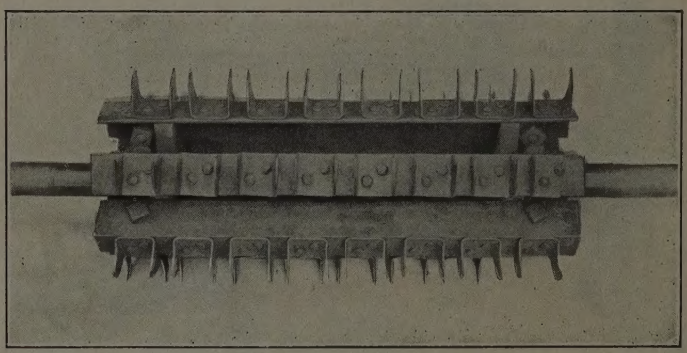

FIGURE 6.—Shredder head showing hooked teeth riveted to angle-iron bars bolted into the head. Six, eight, ten, or twelve bars are used in the shredder head according to the size and make of the husker

Three types of heads are used, the shredder head, the cutter head, and the combination head. The shredder head is fitted with teeth and, as the name indicates, shreds the stalks as they are advanced by the snapping rolls. (Figs. 6, 7, and 8.) The cutter head (figs. 9 and 10) which consists of from one to four knives cuts the stalks into pieces from one-half inch to 4 inches long. The different lengths may be obtained in some machines by changing the number of knives (the greater the number the shorter the cut), and in other machines by changing the gears that drive the feed apron and snapping rolls. The slower the snapping roll speed with respect to the head speed, the shorter the cut. The combination head (figs. 11 to 14) is fitted with both shredder teeth and knives.

The pulley on the head shaft is belted directly to the power unit which operates the husker-shredder, and the speed of the head determines the speed of the other units of the husker. It is important,

therefore, to keep the head up to rated speed to insure efficient operation of the machine. The speed of the head is rated by manufacturers in number of revolutions per minute and is indicated on the machine. Shredder heads generally are rated at 1,000, and cutter heads at 750 revolutions per minute, while combination heads vary in speed according to make of machine.

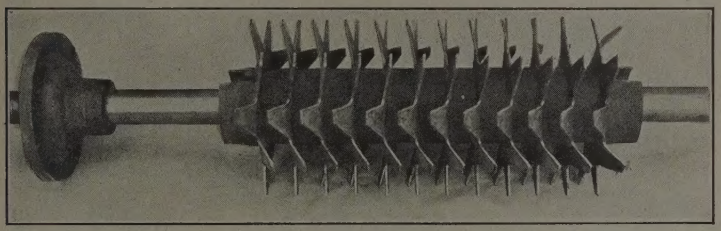

FIGURE 7.—Shredder head with blades stamped out of a steel plate. The teeth are staggered so that every point of the shear bar is covered by a shredder tooth during one revolution of the head

SHEAR BAR

Shear bars, when used on huskers equipped with horizontal rolls, are mounted just back of the lower roll. (Fig. 2 *m*.) On machines using vertical or combination snapping rolls, the shear bar is mounted (fig. 1, *m*) with one edge close to the snapping rolls and the other toward the head. The knives on the cutter head should clear the shear bar about one-sixteenth of an inch. The stalks pass through the snapping rolls, over the shear bar, and are cut or shredded against this bar. To function best, the shear bar should

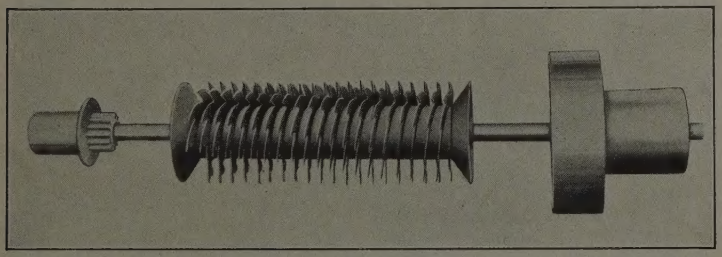

FIGURE 8.—Saw-tooth shredder head. The shredder teeth are stamped steel and are arranged in the form of a spiral. Thus one revolution of the head causes a tooth to pass all points on the shear bar

have a sharp working edge. This edge is maintained differently in different machines, as by turning the shear bar over, turning the bar end for end, or replacing it entirely if the bar is not reversible.

The shear bar must be used on huskers equipped with cutter heads but may or may not be furnished with shredder heads.

SHELLED-CORN SEPARATING AND CLEANING DEVICES

Some husker-shredders leave a smaller percentage of the live borers in the shredded stover than do others even though the kills may

be the same. This is due to differences in the effectiveness of the separating devices. Huskers with characteristics similar to those shown in Figure 2 are effective in separating the borers from the shredded stover. The long shaker with the slat work at the rear end allows

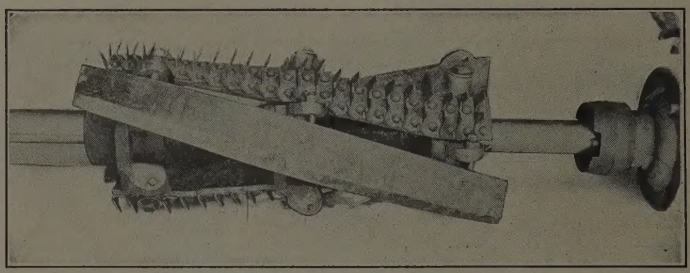

FIGURE 9.—A cutter head equipped with four full blades. This head may be operated using two blades, one on each side of the head, or using one blade with counterbalances on the opposite side of the head

the shelled corn, live borers, pieces of cob, and bits of shredded stover to fall through onto the shoe below, where the shelled corn is separated out. Most of the surviving borers remain with the shelled corn because of the fact that when they instinctively curl up

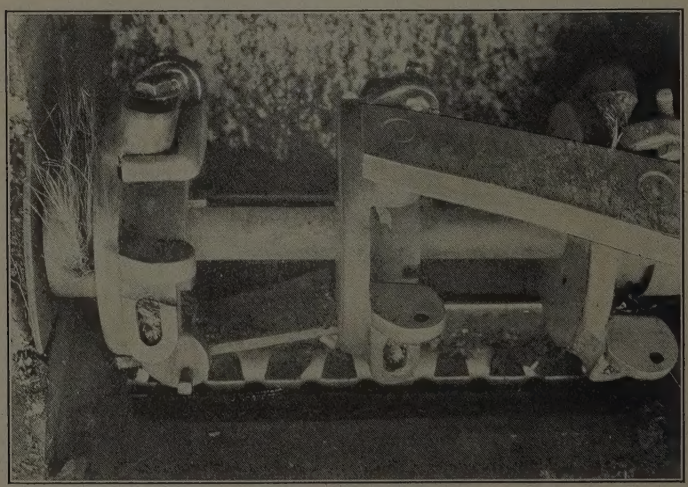

FIGURE 10.—Cutter head in position equipped with two half-knives. The claim is made that two half-knives set up less vibration than one full knife with counterbalances

their size is about that of a kernel of corn. The shelled corn then passes over a fine screen and into the shelled-corn auger or cross shake. Some of the borers, however, go through this screen and are found on the ground under the machine.

Figures 1 and 5 show two types of huskers which use a single shaker running the entire length of the machine. The front part of the shaker is made of corrugated steel fitted with riveted-on-fish-backs to carry the husks and pieces of stalk back from under the

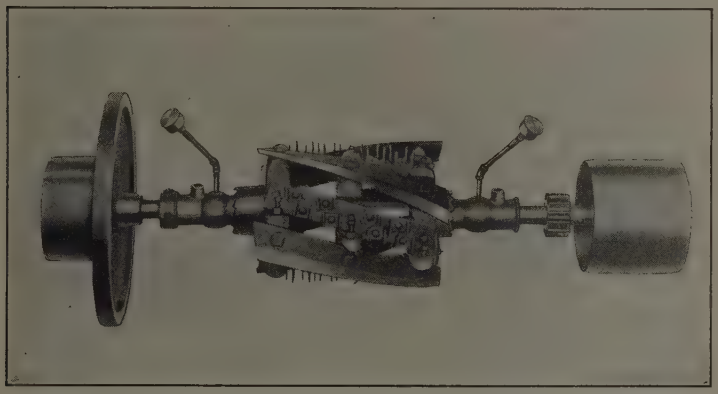

FIGURE 11.—A combination head equipped with four knives and four shredder bars. It is possible to equip this type of head with 2 or 4 knives, 2 or 4 shredder bars, or combination of 2 or 4 knives with 2 or 4 shredder bars

husking rolls. The shaker has a no-choke sieve extending from a point under the head to the rear end of the machine. This allows the shelled corn, live borers, and other material to drop on the bottom below. The shaking motion causes the corn to move to the

FIGURE 12.—Combination head equipped with two shredder bars and two knives. This head may be converted into a 2-knife head by removing the shredder bars, or into a 4-knife head by replacing the shredder bars with knives

rear of the machine, pass over a fine screen, and to come out at the rear end.

Two other types of separating devices are shown in Figures 3 and 4. Both have the slatted-chain conveyor to move the husks back

from under the husking rolls. The machine shown in Figure 3 has a separator made up of a no-choke sieve with a sheet-iron bottom starting below the head and continuing to the rear. The shelled corn and some of the live borers are shaken out and fall on this bottom, then slide down into the cross shake. In the machine shown in Figure 4 the slatted chain continues back over the shaker and

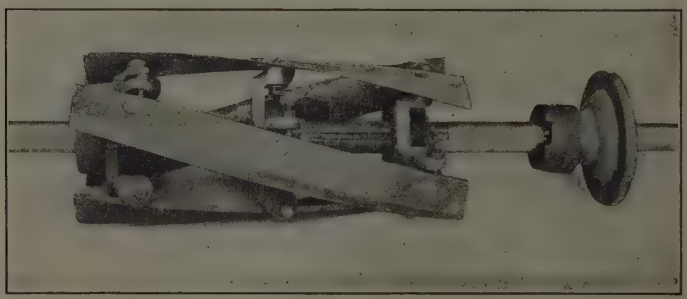

FIGURE 13.—Combination head equipped with two knives and two shredder bars

returns under the machine. The shaker has a perforated top and vibrates under the conveyor. The cross shake on these huskers has a screen bottom which separates most of the dirt from the shelled corn before delivering the corn to the bag.

BLOWER

The blower unit (*p*, figs. 1 to 5) delivers the shredded or cut stover to the mow, shed, or stack. When shredding, the hood on the end of the blower pipe should be moved from time to time to distribute the stover evenly over the pile. This prevents the heavy, moist pieces from piling up in one place and thus causing spoilage of stover. Care should be taken to maintain proper speed of the blower, otherwise clogging may result.

FIGURE 14.—Combination head made to operate in a husker without a shear bar. The triangular-shaped end on these shredder knives is sharpened so that it cuts the stalks. The edge of the blade from the knife section to the spacer rings has a serrated edge that tends to shred the stalks

TRANSPORT TRUCK

Four-roll or larger husker-shredders are equipped with 4-wheel transport trucks. (Figs. 4 and 5.) The rear wheels are mounted on a plain, dead axle. Two types of front axles are used, the pivot or auto type axle and the fifth-wheel or wagon type. There is less tongue whipping with the pivot axle, but this factor is of little consequence when the machine is moved with a tractor.

CARE OF HUSKER-SHREDDER

PREPARATION FOR THE SEASON'S WORK

The preparation of the husker for the coming season's work may start as soon as the work of the previous season is finished. Any

new parts needed should be ordered early because of possible delays in shipment. Every nut should be tried and tightened if necessary. The knives should be sharpened if the cutter head is to be used, or the teeth straightened if the shredder head is employed. If the edge of the shear bar is rounded badly a new edge should be applied. While all bearings should be adjusted to remove any lost motion, in doing this care must be used not to cause binding and consequent heating. Each shaft should turn easily by hand. Broken slats in machines having slatted shakers should be replaced, and bent lips on the shaker having the no-choke sieve should be straightened. Any broken boards in wood-frame huskers should be replaced and any dents in the steel housings taken out. Belts should be examined and repaired, and replaced where necessary. A belt lacing in the condition shown in Figure 15 is dangerous to the operator and likely

FIGURE 15.—Belt lacings in this condition should be repaired to prevent the end of belt tearing out

to result in delays at a busy time. Broken or badly worn chain links should be replaced.

Any repairs made during the off season will save time and trouble when husking time arrives. The operator should make a practice of having his husker in the best possible condition at the beginning of each season. His husker will then last longer, and if custom work is done his customers will be better satisfied if he is able to operate continuously whenever the weather is favorable.

CARE DURING OPERATION

The operator of any power-driven machine should become accustomed to its normal sound. This is especially important in the case of a machine that performs a number of operations, such as the husker-shredder. Any unusual noise should be investigated immediately. A knife or shredder bar may work loose. This should be located and the bar tightened immediately. (Fig. 16.) Prompt

tightening of a loose knife may prevent damage to the head and its supporting casting. The repairs needed in case of an accident of this type are expensive.

Serious damage may further result from undetected stones or other hard material fed with the stalks into the husker. In such a case an emergency stop should be made immediately and the foreign material removed. Even though the snapping rolls or the head may have escaped damage the blower unit would be subject to damage.

All bolts on the husker should be checked periodically. Many of them can be checked on days when it is not possible to husk, but especial attention should be given to the head bolts and those holding the shear bar, and main bearing caps. Particularly should the head bolts be checked often after knives or shredder bars have been changed. The operator may check the tightness of the bolts in the head of his machine a dozen or more times without finding a loose

FIGURE 16.—Head bolts should be checked periodically, especially after knives or shredder bars have been changed

bolt, but if he should find one at the next inspection he will have been repaid for all his effort.

The knives on the cutter head should be kept sharp. This will save power and will reduce the strain on the husker. The clearance between the knives and shear bar should be adjusted carefully and kept at about one-sixteenth of an inch, although for corn-borer control a slightly greater clearance is more effective. Care should be taken to have the clearance sufficient to prevent any possibility of a knife catching on the shear bar.

Before engaging the tractor clutch, particularly in cold weather, the husker should be turned by hand to see that all parts are free. If some of the parts are frozen together a little hot water will loosen them. Snow and ice often lodge around the snapping rolls and cause the lower roll to freeze to the shear bar. Another common trouble is the freezing down of the conveyor feeder. If there is snow or ice

in the butts of the stalks, when stopping work the clean-out doors at the lower end of the shelled-corn elevator and other elevators should be opened and all snow and slush removed.

The husker is generally set up just outside the barn, where it remains until the job is finished. Here it receives some protection from high winds, while the end of the blower, being inside the barn, is protected against snow and rain. If, however, the blower pipe is exposed to the weather it should be lowered at night, placed on the transport bracket, and the end covered. The feeder and feeding gears should likewise be covered each night so as to prevent the freezing down of the conveyor chain and the snapping rolls in the event of bad weather. Belts should be covered, or removed and put in a dry place.

PREPARATION FOR STORAGE

At the end of the husking season the machine should be carefully prepared for storage. First clean the machine thoroughly both inside and out, and then grease all bright metal parts to prevent rusting. The head parts, snapping and husking rolls, blower fans and metal fodder chute leading to the blower, should be given especial attention. Any wooden parts showing signs of weathering should be painted with a good grade of paint. The entire machine should be painted at intervals depending upon the weathering it receives. The old grease and oil should be washed out of the bearings to dispose of any dirt or grit that may have accumulated, and replaced with fresh materials. A list should be made of all parts that need replacing for the next season's runs, and any minor repairs or adjustments needed should be noted.

Often the husker-shredder may be stored to better advantage by removing some of its parts. A space otherwise too small may be used if this is done. The shed that houses the husker should have good side walls and a roof free from leaks. If the floor is of dirt or cinders, it should be fairly level and well drained, and boards should be placed under the truck wheels.

BELTS AND CHAINS

Belts supplied on husker-shredders usually are of waterproof rubber composition and require very little attention. They should, however, be run with the smooth side next to the pulley, otherwise the rib will be worn away and the life of this belt shortened. Sometimes leather or canvas belts are used. Leather belts should be run with the hair (smooth) side next to the pulleys, while either side of a canvas belt may be next to the pulleys. To obtain maximum service from canvas and leather belts they should be protected from moisture and treated to keep them soft and pliable. Neatsfoot oil should be used on leather belts and a good belt dressing on canvas belts. Never use a mineral oil on belts.

Belts should be run just tight enough to prevent slipping and flapping, but not so tight as to set up excessive strains in the shafts and cause heating of the bearings. Wiping the inside of a new rubber belt with a damp cloth to remove the powder will reduce its slippage. When belting up a machine, damage to the belt may be

prevented by turning the belt on to the pulley rather than resorting to hammering or prying.

Detachable link chains should be run as shown in Figure 17. Otherwise there is a tendency for the pull of the load to close the hook on the links and cause them to bind. Roller chains, which are used on the heavier drives of some huskers, require a good grade of machine or engine oil. While roller chains are usually shielded from dirt they should nevertheless be cleaned periodically. To clean them, they should be removed, rinsed in gasoline or kerosene, dried, and dipped in an oil bath. Detachable-link chains may be lubricated with engine oil or cup grease. Chains should be kept tight enough to permit of only slight sag.

FIGURE 17.—The hooks on chain links must be on the outside and run forward

LUBRICATION

An important consideration in the care of any machine is its lubrication, the purpose of which is to reduce friction between moving surfaces and thus prevent unnecessary wear. An oil film must be maintained between these surfaces; this is accomplished by one of the following methods commonly used on machines of the husker-shredder type: (1) Wick oilers; (2) grease cups; (3) pressure lubrication.

Where wick oilers are used engine oil or a good grade of machine oil should be used. The wicking in the cups or wells should be kept loosened so that a sufficient flow of oil to the bearings will be maintained. A soft cup grease is used when either the grease cup or the pressure system is provided. A grease cup is filled and screwed down until the grease starts out of the end of the bearing. This not only insures complete lubrication, but also forces out any dirt or grit that may have collected. If the pressure system is used, grease coming out of the end or other parts of the bearing is reasonably good evidence that the part is thoroughly greased.

The head shaft, blower shaft, and snapping-roll shafts operate at high speed and under high bearing pressure; hence to insure thorough lubrication they should be greased at least three times during each half-day's run. The husking-roll bearings, the bearings on the shelled-corn cleaning fan, and the gearing that drives the snapping rolls and feeder should be oiled at least once during a half-day's run. The pitman bearings can not be oiled while the husker is in operation but should be thoroughly oiled before starting each half-day's run. The transport trucks should be greater every 50 or 60 miles. Always use engine oil or a good grade of machine oil. Avoid the use of used crankcase oil, since it has little body and contains much grit and dirt. Never use axle grease in grease cups. Keep all oil and grease supplies free from dirt.

The husker-shredder is used in the fall and winter when an oil becomes thick and does not flow readily. The oil may be warmed by the heat of the tractor and thus caused to flow from the can, but it may thicken on contact with the cold bearing caps and other parts, and cause inadequate lubrication. Under these conditions use an oil that is thin enough to flow quite freely when cold. In extremely

cold weather it may be necessary to mix kerosene with the oil to give it the required fluidity.

OPERATION AND ADJUSTMENT FOR CORN-BORER CONTROL

In areas infested with the European corn borer the husker-shredder has proved to be very effective in destroying borers. Tests have shown that with proper adjustment and careful operation, kills of from 95 to 98 per cent of the borers can be made. Most of the borers are killed while passing between the snapping rolls, but the mortality is increased by the action of the head, and probably still further by contact with the blades of the blower fan. The effectiveness of the shredder head, the combination head, and the knife head cutting lengths of 2 inches or less, is about the same.

EFFECT OF SNAPPING-ROLL PRESSURE ON THE PERCENTAGE OF BORERS KILLED

Snapping rolls alone, properly adjusted, kill from 80 to 90 per cent of borers in the stalks, the highest kills being obtained when the pressure on the rolls is greatest. There is a direct relationship in all types of huskers between pressures on the snapping rolls up to 1,000 pounds, and the percentage of borers killed. Tests have shown that the kill is raised approximately 6 per cent by increasing the pressure on the snapping rolls from 400 pounds to 1,000 pounds, but that the mortality is only slightly further increased with pressures in excess of 1,000 pounds.

LIVE BORERS IN SHREDDED STOVER

Some of the borers surviving the snapping rolls and the cutter or shredder head are shaken out of the stover and deposited in the shelled corn, or on the ground under the machine, where they can be easily destroyed by methods described later. The living borers remaining in the stover are blown into the mow. Repeated tests have shown that practically all such borers are destroyed ultimately by (1) injuries received while passing through the husker, (2) drying out of the fodder, (3) being fed to livestock, or (4) being trampled into the manure, incident to the feeding of the shredded stover or its use as bedding.

It has been found by experiment that the higher percentages of live borers are left in the stover when the lower snapping-roll pressures are used. Thus it can be assumed that any adjustment of the snapping rolls and head that will give the highest kill will also tend to leave the smallest percentage of the borers alive in the shredded stover. As shown in Table 1, knife heads that cut the stover in 4-inch lengths leave the highest percentage of the borers alive in the cut stover, and those making ½-inch cuts leave the lowest percentage.

TABLE 1.—*Relation between the lengths of cut, per cent of borers killed, and per cent of borers left alive in the cut stover*

Length of cut	Borers killed	Borers left alive in cut stover
Inches	*Per cent*	*Per cent*
4	93.2	4.5
2	95.0	2.1
1	96.4	.6
½	98.0	.5

LIVE BORERS IN SHELLED CORN AND UNDER HUSKER

The borers left alive in the shelled corn by the husker can best be killed by feeding the corn to chickens or hogs. This shelled corn never should be mixed with the ear corn as the live borers would then be able to bore into the pith of the cobs where, being protected, they might complete their life cycle. The shelled corn should be fed in a trough or on a tight feed floor where the borers will be picked up before they can obtain shelter by crawling into straw, corncobs, or other material. If the corn is not to be fed, it should be treated in such a way as to kill the borers. This may be done by grinding, or by heating it to 160° F. and keeping it at this temperature for at least five minutes.

After the completion of the work at each set-up the material on the ground under the husker-shredder should be carefully collected and burned to kill the borers that may have been missed.

EFFECT OF SPEED OF HEAD ON PERCENTAGE OF BORERS KILLED

The percentage of borers killed varies directly with the speed at which the machine is operated up to normal speed, when the kill is at a maximum. Usually this is 1,000 revolutions per minute for the shredder head, and 750 to 850 revolutions per minute for knife or cutter heads. Running the head at 20 per cent below rated speed was found to decrease the kill of borers from 2 to 3.5 per cent, and to increase the percentage of borers left alive in the shredded stover when either a shredder head or a combination head was used.

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U. S. GOVERNMENT PRINTING OFFICE: 1931

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